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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT ASSOCIATION

APPRAISAL OF THE 1962-1966 INVESTMENT PROGRAM OF THE KOREAN NATIONAL RAILROAD

August 10, 1962

Department of Technical Operations

CURRENCY EQUIVALENTS

US$1.00	=	Hwan 1,300
Hwan 1.00	=	US$0.00077
Hwan 1 million	=	US$770.00

The unit of currency was recently changed to Won, which is equal to 10 old Hwan. Throughout this report, figures are expressed in the old Hwan.

Fiscal Year

January 1 to December 31

Totals may not add because of rounding.

APPRAISAL OF THE 1962-1966 INVESTMENT PROGRAM
OF THE KOREAN NATIONAL RAILROAD

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Summary

i) The Government of Korea has asked IDA for a credit to finance a significant part of the Korean National Railroad's 1962-1966 Investment Program. The borrower would be the Government of Korea.

ii) IDA believes that the priorities of the Korean railroad require that IDA finance (a) 800 coal cars, (b) 75 third-class and 40 second-class passenger cars, and (c) US$100,000 for financial consultants. The total credit would be US$14.0 million equivalent.

iii) The Korean National Railroad is State-owned. It does not exist as a separate legal entity, nor does it have its own independent management, but is an integral part of the Ministry of Transportation. The Ministry has substantial authority in the operation of the Railroad, but must secure the approval of the Supreme Council of National Reconstruction on such matters as general rate and fare increases, wage and salary increases, major reorganizations, and the annual budget.

iv) In spite of some organizational deficiencies, the management and operation of the Railroad is satisfactory. Employees are generally selected by competitive examination, and bureau chiefs are chosen from among outstanding employees.

v) The property of the Railroad was heavily damaged in the Korean war, but has been substantially rehabilitated. The only significant exception is passenger cars. Maintenance is generally good.

vi) Freight traffic increased from 10.4 million tons in 1955 to 15.4 million tons in 1961, or about 7 percent annually. During this period the number of passengers grew from 57.3 million to 88.3 million, or about 8 percent per year. These increases compare to an annual population growth of about 2.5 percent, and an increase in gross national product of 4.5 percent. By far the most important commodity carried is coal, which in 1961 accounted for 46 percent of the commercial revenue freight. The railroad traffic is not now or in the foreseeable future subject to significant highway or shipping competition.

vii) The Railroad's operating efficiency is very good, has been improving continuously, and compares favorably with that of other railroads in East Asia.

viii) The Railroad does not have cost accounting, balance sheets, profit and loss and other financial statements, so that a definitive conclusion concerning its financial position is impossible. It would appear however, that,

while its position is not now satisfactory, it can be made sound by raising unduly low rates and fares and by a policy of offsetting wage and price increases promptly by rate and fare increases. The Railroad is now beginning to establish a modern accounting and statistical system, but needs assistance for this purpose.

ix) The Railroad's 1962-1966 Program, designed to increase capacity and improve efficiency, is estimated to cost (without an allowance for contingencies) Hw 215.5 billion (US$165.8 million equivalent), including US$80.7 million in foreign exchange. While the Program is reasonably balanced it exceeds available funds by at least Hw 75 billion (if an allowance is made for contingencies), and would require more than US$50 million in foreign exchange above the amount now in sight. In addition, the Association believes that the Railroad's traffic forecast is too high and that some parts of the Program do not appear justified at this time, and therefore recommends postponement of some parts of the Program beyond 1966. The cost of the revised Program, including contingencies would be Hw 194.0 billion (US$149.2 million equivalent), including US$59.8 million in foreign exchange. Making equivalent allowances for contingencies, the revised program involves a reduction of about 20 percent from the Government's program, with foreign exchange requirements reduced by nearly 30 percent.

x) To finance the foreign exchange costs of the revised Program of US$59.8 million, the Government has already committed US$3.5 million out of its own foreign exchange resources and has a reasonable anticipation at this time of receiving US$31.0 million from AID and IDA. To obtain the remaining US$25.3 million during the next 4½ years should not present unreasonable difficulties, especially since US$17.7 million will not be needed until after 1963.

xi) The cost of the revised Program, plus loan repayments in 1962-1966, will total Hw 202.0 billion. To finance this, the Railroad can expect to obtain Hw 71.8 billion internally, Hw 40.3 billion from foreign loans now under consideration, and Hw 50.7 billion from the General Account, or a total of Hw 162.8 billion. To finance the deficit of Hw 39.2 billion, and to permit an increase in working capital, the Government has agreed to raise freight rates in 1963 and the Railroad will require loans of about Hw 16.0 billion in 1962 and Hw 4.0 billion in 1963 if the Program is not to be delayed.

xii) The Project is that part of the revised 1962-1966 Railroad Program which involves (a) procurement and manufacture of rolling stock during 1962 and 1963; (b) completion of the Hwanji line in 1963; and (c) establishment of a modern accounting and statistical system. Its total cost will be Hw 35.3 billion (US$15.9 million equivalent) and it accounts for about 27 percent of the foreign exchange cost of the whole Program and 18 percent of the local expenditures. All procurement under the IDA credit will be on the basis of international competitive bidding.

xiii) The Project is technically sound and of high priority for the economic development of Korea. It is suitable for an IDA credit of US$14.0 million. To help assure its financial and economic success, the Government

has agreed to a number of conditions, such as the appointment of a railroad manager; making the Railroad a separate agency; an early increase in freight rates and further rate or fare increases as needed to offset wage and other cost increases; and consulting IDA before undertaking certain parts of the Investment Program having a lower priority.

I. INTRODUCTION

1. The Government of Korea has asked IDA for a credit to finance a significant part of the Korean National Railroad's 1962-66 Investment Program which includes rehabilitation, modernization and expansion to provide additional capacity mainly through the procurement of locomotives and rolling stock, and to reduce operating costs primarily by dieselization. The borrower would be the Government of Korea.

2. IDA believes that the priorities of the Korean railroad require that IDA finance (a) 800 coal cars; (b) 75 third-class and 40 second-class passenger cars which would cost about the same as the 100 second-class cars applied for; and (c) US$100,000 for financial consultants. The total credit would be US$14.0 million equivalent.

3. This report assesses the technical, economic and financial aspects of the Program, based on the findings of an IDA mission which visited Korea in April 1962.

II. THE RAILROAD

A. Organization, Management and Labor

4. The Korean National Railroad is State-owned. It does not exist as a separate legal entity, nor does it have its own independent management headed by a railway manager, but is an integral part of the Ministry of Transportation. The Government recently considered establishing the Railroad as a separate body with its own management, but decided against this at least until such time as its assets and liabilities are properly identified and evaluated. The necessary inventory was recently started and is estimated to take about two years.

5. The Ministry of Transportation is responsible for the operation of the Railway; the inspection and licensing of trucks and the issuing of route certificates for buses; the operation of airports and the regulation of civil aviation; the regulation of commercial maritime operations; and the operation of eight tourist hotels. The Ministry has eight central bureaus, plus a number of regional ones. Of the eight central bureaus, four deal virtually exclusively with the Railway: the Land Transportation Bureau (traffic and operations), the Engineering Bureau (civil engineering), the Machinery and Electricity Bureau (mechanical engineering), and the Railroad Construction Bureau (new line construction); two others - the Finance and Accounting Bureau and the Supply Bureau - deal also with non-railway matters, though most of their work is for the Railroad; the two remaining ones are the Marine Bureau and the Tourism, Highway and Aviation Bureau. The bureaus are coordinated by a Planning Coordinator, whose main function however is to coordinate the planning of the Ministry with that of the national Economic Development Board. The cooperation of the bureaus is reasonably good, primarily because the staffs have worked together for many years, but could be improved by the appointment of a Railroad manager to which the Government has agreed in the Credit Agreement. As part of the Credit Agreement, the Government has agreed to establish before

June 30, 1963, a separate office in the Ministry of Transportation which will be responsible only for the management and operation of the Railroad; and the Government has also agreed to make the Railroad a separate agency promptly after the establishment of a sound accounting system.

6. The Ministry has substantial authority in the operation of the Railroad. Important areas in which it must secure the approval of the Supreme Council of National Reconstruction are general rate and fare increases, wage and salary increases, major reorganizations, and the annual budget, including major investments.

7. The Railroad's staff is competent and generally makes a good impression. In general, the Railroad is well managed and there is no evidence of deficiencies in the handling of traffic, operations, and engineering matters. In the financial and economic area, however, the Railroad's practices are out-of-date and require major improvements (see paragraph 42).

8. The Minister of Transport, the Vice Minister and the workshop managers are high army officers, but there are indications that the Government is replacing more and more army officers in civilian positions by civilians. The Minister and Vice-Minister are appointed by the Prime Minister with the approval of the Chairman of the Supreme Council. Bureau chiefs are usually selected from outstanding employees who have advanced to the position of section chief. Employees are generally selected by competitive examination, and may become members of a craft union. The tenure and status of officers and employees does not differ from that of other Government employees.

9. As shown in detail in Table No. 1, the number of employees has declined in recent years from 31,092 in 1956 to 26,316 by the end of 1961. At the same time, productivity has been going up, the number of traffic units handled per employee increasing by nearly 50 percent from approximately 200,000 in 1956 to nearly 300,000 in 1961.

B. Property

10. The Korean National Railroad is the only railroad in Korea and covers the country reasonably well. At the end of 1961 it operated 2,896 route-km of standard gauge lines (4'8½") and 126 km of narrow gauge lines (3'). The main-line from Seoul to Pusan (470 km) is double track; all other lines are single track. There are many sections in the mountainous areas with steep gradients up to 1 in 30.

11. The Railroad property, especially its rolling stock, suffered severely from inadequate maintenance during World War II and from heavy damage during the Korean War. Most of the damaged properties have been rehabilitated since 1953, but a few buildings, workshops and running sheds still show damage, and there is still a lack of rolling stock. Since the end of the war in 1953, 270 km of new lines have been constructed, mainly to connect coal mines and industrial plants with the Railroad system.

12. The lines in the coal mining area in the northeast of Korea from Tongni to Samchok and the port of Mukho are connected with the main system of the Railroad only by a rope railway, which climbs 210 m over a distance

of 1 km. The capacity of this rope railway is limited to 600 net tons in 24 hours, since only one car with 15 net tons can be handled at a time. In order to facilitate increased coal and cement shipments from the Samchok area, an 8 km long rail detour is being constructed.

13. The total track length, including double tracks and sidings, is 4,489 km standard gauge and 146 km narrow gauge. About 1,040 km of the standard gauge tracks are laid with 50 kg rails and 2,600 km with 37 to 40 kg rails. The narrow gauge tracks are mainly laid with 22 kg rails. About 10 percent of the 50 kg and 37 kg rails were laid or relaid since 1955; the remainder is more than 30 years old. Ballasting is good. The ties are of treated wood, imported from abroad, and are generally in good condition. The track is generally well maintained, and will be adequate for new and heavier equipment.

14. The signalling system is adequate, being color light in the Seoul area and on a part of the Seoul-Pusan line, and electric block instruments on the southern section of the Seoul-Pusan line and on most of the single track mainlines. The telecommunication system is satisfactory.

15. The damaged workshops are almost rebuilt and they are well equipped with modern machinery. Since the Railroad is in the process of replacing steam traction by dieselization, the workshops have ample space. It is therefore possible to increase their capacity for repairs or even for construction of new rolling stock. The workshop at Inchon was a car factory before the war, and is now again producing passenger cars at a rate of 5 to 6 per month. Its capacity can be increased to meet most long-run needs since only two-thirds of its buildings have been rehabilitated so far.

16. Satisfactory maintenance facilities for diesel locomotives and railcars exist at Pusan, Changyangni, Chaechon and Taejon. Not all of the damage to the maintenance facilities for steam locomotives has been repaired because the Railroad, hoping to eliminate steam traction by 1964, has postponed their complete rehabilitation.

17. War losses of freight cars have been almost made up as far as numbers are concerned, but there is some obsolete stock due for scrapping (see Table No. 2). The Railroad lost about 40 percent of its passenger cars during the Korean War and the remainder was in bad condition at the end of the war. To offset the losses, the Railroad purchased about 120 second-hand passenger cars from American railroads and is still using 460 converted box cars and even plain box cars for passenger transport. The serviceable stock now consists of 9,230 freight cars and 1,260 passenger cars (of which 460 are converted box cars of about half the seating capacity of standard passenger cars), compared to about 11,400 freight cars and 1,250 passenger cars before the Korean War.

18. The serviceable motive power consists of 179 coal burning and 100 oil burning steam locomotives, 95 diesel electric locomotives and 31 railcars, compared with about 600 steam locomotives before the Korean War (see Table No. 2). The fact that 100 steam locomotives have been converted for oil burning even though Korea produces substantial amounts of anthracite is due to the unsuitability of the local anthracite for burning in locomotives which therefore has to be pressed into briquets with the use of imported coal tar pitch.

19. The maintenance of diesel locomotives, railcars and rolling stock is good, but that of steam locomotives is kept to a minimum necessary to keep them running until the completion of dieselization in a few years.

C. Traffic

20. Passenger traffic has contributed significantly more to the Railroad's gross revenues than freight traffic. The latter accounted for about 30 percent of revenues in 1957; this proportion had increased to 42 percent by 1961, and is expected to reach 45 percent by 1966. In terms of trains-kms, however, freight has accounted for nearly 60 percent of the total in recent years.

Freight Traffic, 1955-1961

(Millions of Tons)

Year	Commercial Freight	Military Freight	Railroad Service Freight	Total Freight	Total Net ton-kms (billions)
1955	5.0	4.0	1.4	10.4	2.1
1956	5.6	4.0	1.4	11.0	2.3
1957	7.0	3.7	1.3	12.0	2.6
1958	7.3	3.4	1.4	12.1	2.7
1959	9.0	3.2	1.5	13.8	3.1
1960	10.2	2.8	1.4	14.4	3.3
1961	11.1	2.9	1.4	15.4	3.5

Total freight tonnage has increased about 7 percent annually and total ton-kms about 10 percent between 1955 and 1961 (for details see Table No. 3). These increases compare with a growth in real gross national product of about 4.5 percent annually during this same period. The percentage increases from 1959 to 1961 were considerably less than the average of the preceding five years, reflecting the sharp drop in the growth of gross national product in 1960 and 1961.

22. As shown in the above table, commercial revenue freight increased from 5.0 million tons to 11.1 million tons between 1955 and 1961, or nearly 20 percent per year, with a substantially smaller growth since 1959. By far the most important commodity carried is coal, which in 1961 accounted for 46 percent of the commercial revenue freight. Other major commodities are fertilizer (7.2 percent), cement (5.4 percent), rice (4.5 percent), ore (3.6 percent), and timber and petroleum (2.7 percent each). The most important change in the composition of the commercial revenue freight between 1955 and 1961 was the relative increase in coal from 27 to 46 percent. Railroad service freight has remained stable since 1955, with a decline in coal offset by an increase in other service freight. Military freight has declined substantially.

23. The average haul of commercial revenue freight has increased from 213 km in 1955 to 242 km in 1961. However most of this increase took place between 1955 and 1956; since 1958 the average haul has remained relatively stable.

24. The traffic density has increased sharply from about 736,000 ton-kms per km of line in 1955 to 1,245,000 ton-kms in 1961. This reflects the rapid growth in ton-kms while the system increased only slightly from about 2,800 km to 3,022 km during this period.

25. Passenger Traffic, 1955-1961

Year	Millions of Passengers
1955	57.3
1956	66.3
1957	53.4
1958	70.1
1959	71.5
1960	75.7
1961	88.3

Passenger traffic increased about 8 percent per year between 1955 and 1961 (for details see Table No. 4). This compares to an annual population growth of about 2.5 percent and to an increase in gross national product of about 4.5 percent. The above table shows that the annual traffic growth has fluctuated widely. Nearly three-fourth of the traffic is accounted for by 3rd class passengers, and about one-fifth by students.

26. Average distances travelled by passengers have not changed significantly in recent years. The traffic density, however, increased from 1.3 million passenger-kms per km of line in 1955 to nearly 1.8 million in 1961.

D. Competition

27. With a well developed railway system, and a limited system of paved highways which would be difficult and costly to enlarge sufficiently so that it would cover most of the country, neither railway passenger nor freight traffic is now or in the foreseeable future subject to significant competition from buses and trucks. The Ministry of Transportation has full authority to license trucks and issue route certificates for buses, and in doing so takes into account the volume of existing and anticipated traffic to avoid uneconomic competition. The number of buses licensed has remained stable for the last six years, as has the total operating route. About half the buses operate in the Seoul area; most of the remainder operate in rural areas where there is no railway, and where they provide feeder service to the railway. Because of the heavy foreign exchange cost of gasoline, the Ministry has purposely restricted bus transportation primarily to areas where railway service is inadequate. The 3rd class railway passenger fare per km of Hw 5.2 is less than half the Hw 11.00 bus fare.

28. The situation is very similar for trucks. The total number of trucks licensed increased only slightly from 9,590 in 1957 to 10,149 in 1961; in the latter year it was actually lower than in the three preceding years. Railroad freight rates per ton-km are still substantially lower than truck or ship rates, even after a 25 percent increase of June 1, 1962:

Commodity	Rail	Truck	Ship
	(Hw per ton - km)		
Coal, Ore, Cement	6.70	62.00	12.10
Fertilizer, Rice	6.70	62.00	14.52
Gasoline	14.10	62.00	29.04
Imported Materials	14.10	62.00	14.52

29. The highway system is relatively limited. The current Five-Year Program calls for expenditures of Hw 37.6 billion, of which Hw 18.4 is for bridge construction, Hw 4.3 billion for roads in coal mining areas to serve as feeders to the railway, Hw 10.9 billion for highway paving, and only Hw 4.0 billion for new highway construction. Coordination of highway and railroad construction plans is the responsibility of the Planning and Coordination Committee, which consists of the planning coordinators of the various ministries, under the Prime Minister.

30. Shipping is also under the jurisdiction of the Ministry of Transportation but there is virtually no river traffic since most rivers are not navigable, and the cargo fleet for coastal traffic is relatively small. In 1961, coastal ships unloaded nearly one-half million tons of coal, which was by far the largest item carried. A substantial part of this was carried from the north-east coal fields to the Pusan region because of the railroad's inability to carry larger amounts through the bottleneck at Tongni; completion of the Tongni bypass in 1963 should divert significant amounts to the railroad. The same is true to a lesser extent also of cement. A major reason for higher shipping rates is that the size of vessels is limited by the port facilities which cannot be significantly improved at reasonable costs.

E. Operating Efficiency

31. The Railroad's operating efficiency is very good, has been improving continuously (see Table No. 1), and compares favorably with that of other railways in East Asia.

32. The average train speed for the express on the Seoul-Pusan line is 66.8 km per hour; that of a representative freight train 37.1 km per hour. These samples indicate a good performance.

33. Average availability of diesel locomotives is 97 percent, of passenger cars 96 percent, and of freight cars 95 percent; these are satisfactory figures. That of steam locomotives is only 77 percent because the Railroad is not making full use of its steam locomotives during the transition to dieselization.

34. The utilization of motive power is high. For diesels, the engine-km per engine day in the fleet was 402 in 1961, an improvement of about 8 percent over the previous year. The number of traffic units per motive power unit in the fleet was 19.2 million in 1961, an increase of nearly 80 percent since 1955.

35. The rolling stock is used very intensively. The average turn-around time of freight cars decreased from 8.5 days in 1955 to 4.6 days in 1961 The average load has fluctuated at a high level of about 28 to 29 tons per car. And the net-ton-km per freight car in the fleet reached 370,000 in 1961, more than double the 1955 level.

36. The utilization of passenger cars reflects considerable over-loading. The number of passenger-km per passenger-car-km declined from about 60 in 1956 to about 48 in 1957, but has remained at this high level since. This represents a utilization of about 75 percent, which is extremely high since in most other countries a normal rate is 40 percent when allowance is made for the uneven traffic along many lines and during the different hours of the day.

F. Rates and Fares

37. The Budget and Accounting Law of December 19, 1961 (Law No. 849) provides that rates charged by government enterprises are to be set by the Government after review by a public rate-making Committee consisting of the Chairman of the Economic Planning Board (Chairman of Committee), the Ministers of Finance, Agriculture, Commerce and Industry, Transportation, and Communication, and ten other qualified individuals. The Committee was established in February 1962.

38. The freight rate structure is relatively simple, with three classes of freight for carload and three for less-than-carload. The first class includes such commodities as gasoline, textiles, machinery, chemicals, and paint; the second fruits, fish, metallic manufactured goods and timber; and the third rice, grains, fertilizer, cement and coal. Rates are not tapered with increasing distance.

39. Freight rates were increased by 25 percent on June 1, 1962. The previous increase took place on January 1, 1961, when carload rates for first class goods were raised by nearly 73 percent, and those for second and third class about 60 percent. In general, freight rate increases have more than kept pace with price and cost increases (see paragraph 46). A judgment on the absolute level of freight rates is not possible in the absence of cost accounting. However, the fact that freight in 1961 accounted for only 42 percent of gross revenues but for nearly 60 percent of train-kms, as well as the fact that the average revenue per ton-km of revenue freight in 1961 was only about one-third of that of Burma and one-half of that of Thailand would seem to give some indication that freight rates have been low. The 25 percent increase of June 1, 1962, has remedied this situation to some extent.

40. There are three passenger classes. The fare for the third class is one-half of the second class and one-fourth of the first class. Fares were last raised on May 1, 1961, and are now 20 percent above the January 1, 1957 level. This compares with increases since 1957 in the price index of producer goods of 64 percent and in the operating expense per traffic unit of 44 percent. The average revenue per passenger-km in 1961 was 5.9 Hwan (US¢0.54 per passenger-mile), or only about one-half of that of Burma and Thailand. The Korean Government is not now contemplating passenger fare increases.

41. Since the Railroad does not have cost accounting, it is not possible to compare rates and fares with respective costs. However, the indirect evidence - the lag of passenger fare increases behind cost increases, the comparison with other countries and with truck and bus rates, and the generally unsatisfactory earning situation (see paragraph 45) - seems to indicate that rate and fares are too low and could be raised without significant loss of traffic to other modes of transport.

G. Finances and Earnings

42. Until January 1, 1962, the Railroad received its funds from the Government's general budget, like other Government departments. To finance certain special reconstruction costs, it received, in addition, funds from a long-term loan by the Bank of Korea, with an interest rate of 2 percent. The Railroad carries only single entry accounts for revenues and expenditures, and has no capital accounts and balance sheets. However, the Budget and Accounting Act for Government Enterprises (Law No. 928), December 31, 1961, set up a Special Account for the Railroad. The Special Account will receive all railroad revenues and will finance most railroad expenditures; some of them - apparently those which the Ministry of Transportation cannot justify on commercial grounds but which the Government wants to make for other reasons - will continue to be financed out of the General Account. The Act also requires the establishment of a double-entry bookkeeping system with separate capital accounts. This is now being started, but will take about two years to complete.

43. The Railroad has never prepared a balance sheet, but at the Association's request made an estimate for December 31, 1961 (see Table No. 5), which is summarized below:

Assets		Liabilities	
	(Billions of Hwan)		
Current Assets	18.5	Current Liabilities	2.1
Fixed Assets	570.4	Funded Debt	4.8
		Capital	576.7
		Retained Earnings	5.2
Total	588.9		588.9

44. It is doubtful whether this estimate has any real significance. Fixed assets were calculated by adjusting the book value by a price index, and deducting an allowance for depreciation based on the expired life. No allowance was made for obsolescence, nor was any actual inventory of fixed assets made. A foreign technical advisor to the Railroad believes that fixed assets are overstated by perhaps 25 percent. (For a listing of the most important Balance Sheet ratios see Table No. 5).

45. Since the Railroad does not have cost accounting but merely records cash receipts and expenditures like other Government departments, it has not prepared any profit and loss statements in the past. However, on the basis of cash revenues and expenditures, plus an allowance for depreciation of one-seventh of gross operating revenues, it would appear that the operating results in recent years have not been satisfactory, with a net operating loss in all but one year (for details, see Table No. 6):

	1957	1958	1959	1960	1961
	(Billions of Hwan)				
Operating Revenues	26.5	36.1	40.7	44.3	57.3
Operating Expenses (including depreciation)	27.8	38.4	40.0	45.5	58.2
Net Operating Revenues (or Loss)	(1.3)	(2.3)	0.7	(1.2)	(0.9)
Operating Ratio (%)	105	106	98	103	102

46. In the absence of cost accounting it is not possible to determine the reasons for the poor operating results. It is striking, however, that in recent years passenger fare increases have lagged continuously behind cost increases. Passenger fares were not increased for 4-1/3 years after January 1, 1957, even though during this period the prices for producers' goods increased by 47 percent and the operating expense per traffic unit by 43 percent. In comparison to these increases, the May 1, 1961 passenger fare increase (and the minor August 1961 downward adjustment) which raised most fares only 20 percent above the 1957 level, was quite inadequate. This is also reflected in the fact that the revenue per passenger-km increased only about 5 percent - from 5.6 to 5.9 Hwan - between 1957 and 1961 since the 1961 increase did not affect the first four months of the year and did not apply to all passenger traffic. For freight, the situation is substantially better, with carload rates about tripled between 1957 and 1961, less-than-carload rates about doubled, and a further increase of 25 percent put into effect on June 1, 1962. As a result of the 1958 and 1961 rate increases, the revenue per ton-km of revenue freight increased about 150 percent - from 2.8 to 7.0 Hwan - between 1957 and 1961. The increase in freight revenues in this period was 265 percent compared to an increase in operating expenditures of 109 percent, and made up for the lag in the increase of passenger revenues of only 64 percent.

47. Debt service requirements have been low. Cash generated by the railroad in 1961 of Hw9.7 billion was 24 times the total debt service during that year.

48. As indicated above, the Railroad does not have a modern system of cost accounting, which is now required by the Budget and Accounting Act for Government Enterprises. The Railroad's management is conscious of the deficiencies in the area and is giving attention to the matter, including training abroad. The Credit Agreement specifically requires the maintenance of separate accounts for the Railroad, adequate to reflect its receipts and expenditures and capital transactions in accordance with generally accepted commercial accounting practices. However, the Railroad does not now have a sufficiently qualified staff to set up a sound accounting and statistical system, and requires - and would welcome - assistance in this field. Such assistance is intended as part of the proposed credit, and an allowance of US$100,000 is made for this purpose. The financial consultants should also review the desirability of an independent, outside audit of the Railroad's financial statements.

III. THE 1962-1966 INVESTMENT PROGRAM

A. Main Outline

49. The 1962-1966 Railroad Investment Program is a part of the Five Year Transportation Development Plan, which in turn is an important part of the Government's overall Economic Development Plan. The Transportation Development Plan includes only the areas of responsibility of the Ministry of Transportation, - the Railroad, Maritime transport, Aviation and Tourism; highway and harbor construction are the responsibility of the Office of National Construction. All plans have been approved by the Economic Planning Board and the Supreme Council of National Reconstruction.

50. The Railroad Program is designed to expand the railroad's capacity and its network to meet a steadily growing traffic, and to improve operating efficiency and decrease operating costs. The main items of the Railroad's Program are:

a) New and improved lines: construction of 295 km of new lines (see map), and double tracking and electrification of the Seoul-Inchon line (38.9 km).

b) Motive power: procurement of 100 diesel electric locomotives and 145 diesel railcars.

c) Rolling stock: procurement of 185 passenger cars and of 1,055 coal hopper cars; local production of 400 passenger cars and 2,800 freight cars; and remodeling of 825 freight cars.

d) Improved facilities: workshop buildings and equipment; track improvements and additional sidings; improvement of marshalling yards; signalling and communication facilities; and prestressed concrete ties and poles.

51. The cost of the Railroad Program is estimated by the Railroad at Hw 215.5 billion (US$165.8 million equivalent) which does not include an allowance for contingencies (see Table No. 7):

	Foreign Exchange		Local Currency	Total	
	$ Million	Hw Billion Equivalent	Hw Billion	Hw Billion Equivalent	$ Million Equivalent
New line construction	8.8	11.4	38.0	49.4	38.0
Seoul-Inchon double tracking and electrification	7.7	10.0	4.6	14.6	11.2
Motive power and rolling stock	53.0	68.9	36.3	105.2	80.9
Improvement of Railroad facilities	11.2	14.6	31.7	46.3	35.6
Total	80.7	104.9	110.6	215.5	165.7

52. This Program, although reasonably balanced physically, exceeds the estimated available funds by at least Hw 75 billion if a reasonable allowance is made for contingencies; the foreign exchange requirements would be more than US$50 million above the amount now in sight (see Section C below). Furthermore, since IDA believes that the traffic will be below the Railroad's forecast (see paragraph 70) and the some parts of the Program do not appear justified at this time, it recommends that the Program be reduced by postponing some parts of it beyond 1966. Accordingly, the Credit Agreement provides that the Government will review the Program and before undertaking any railroad investment in the items listed in paragraph 53, will inform IDA and give it a reasonable opportunity to comment.

53. The following items of the Railroad's Program should be postponed (see Table No. 8):

a) Completion of the Chinju-Sunchon line, though necessary to improve transportation between Pusan and the south-western part of the country, could be postponed until 1968. Only 50 percent of the Railroad's allocations are therefore included in the revised Program recommended in paragraph 54 below.

b) Electrification of the Seoul-Inchon line for suburban traffic should be postponed until a detailed study of the suburban traffic needs in the Seoul area has been made. (Double tracking of the Yon Dong Po-Inchon section appears justified and is included in the revised Program).

c) Procurement of 145 railcars should be postponed. The traffic estimated until 1966 can be moved with the existing 95 diesel locomotives and 30 railcars, together with the 100 additional locomotives to be procured.

d) Procurement of 85 passenger cars from abroad, including 24 cars for fast luxury services between Seoul and Pusan, should be postponed. Operation of fast non-stop services between Seoul and Pusan depends mainly

on adequate motive power, which is included in the Program. The reduced Program would still include the immediate procurement of 115 passenger cars, to meet urgent requirements, but the balance of standard 2nd and 3rd class cars can be manufactured locally at the very efficient Inchon workshop with substantial savings of foreign exchange.

e) The local manufacture of 2,800 freight cars by 1966 should be reduced to 1,800. The present need for coal cars will be met by the procurement of 800 cars from the IDA credit; the procurement of 200 additional coal cars is postponed until 1965. The further increase of the freight stock capacity should be adjusted to the revised traffic forecast (see paragraph 69). Stretching out the Program would also provide more stable employment at the rolling stock factory, since the Government's Program would end in 1966.

f) The investment in workshop facilities at Inchon to increase the production capacity for rolling stock should be extended over a longer period in line with the recommendation in the preceding paragraph.

54. Taking into account the above reductions but adding an allowance for contingencies of 5 percent for foreign exchange expenditures and of 15 percent for local expenditures in 1962-64, and of 10 percent and 25 percent respectively in 1965-66, the revised Program would cost Hw 194.0 billion (see Table No.8). These estimates and contingencies are believed to be reasonable; however, they make no allowance for a sharp inflation, which, as explained in paragraph 63, is assumed to be offset by rate and fare increases.

	Foreign Exchange		Local Currency	Total	
	Million	Hw Billion Equivalent	Hw Billion	Hw Billion Equivalent	$ Million Equivalent
New line construction	7.6	9.9	32.2	42.1	32.4
Double tracking Seoul-Inchon line	1.6	2.1	4.0	6.1	4.7
Motive power and rolling stock	37.1	48.2	30.2	78.4	60.4
Improvement of Railroad facilities	10.0	13.0	31.5	44.5	34.3
Financial consultants	0.1	0.1	-	0.1	0.1
Total	56.4	73.3	97.9	171.2	131.9
Contingencies	3.4	4.4	18.4	22.8	17.5
Grand Total	59.8	77.7	116.3	194.0	149.4

55. This Revised Program is not directly comparable with the government's Program since the latter did not include an allowance for contingencies. If however the same percentage allowances were added to the government's Program, the Revised Program would involve a reduction of nearly 20 percent with foreign exchange requirements reduced by nearly 30 percent.

B. Need

55. While the Railroad was able to repair nearly all of its war damage, it was not able to increase its capacity sufficiently to keep pace with the growth in passenger and freight traffic since the end of the war. The consequence has been delays in transportation, uneconomic handling of freight and inconvenience for passengers in overcrowded trains. Since further traffic increases are anticipated (see paragraphs 68 and 69), it is essential that these deficiencies should be eliminated and capacity added for future traffic needs. At the same time it is necessary to modernize operations in order to reduce costs, and to construct new transportation facilities in the industrial areas of the country.

56. The need for the individual items of the revised Program is as follows

a) New Line Construction

i) The Hwanji Line (Tongni-Simpori, 8 km) will connect the coal mining area in the northeast with the main Railroad system by eliminating the bottleneck from the existing rope railway. The other section of the Hwangji Line (Hwanji - Baksan, 8 km) and the Chungsun Line (Hamback-Chungsun, 42 km) will provide transportation from newly developed coal fields. These lines are urgently needed for the transport of the expanding coal production, which is essential for Korea's industrial development.

ii) The Kyungbuk Line (Yongji-Chomchon, 58.6 km) will connect the northeast coal mining area with the center of the country and with the port of Pusan and will increase the capacity of the Railroad system.

iii) The Tonghae Pukbu Line (Okkae-Kanguung-Sokcho, 92.9 km) will provide transportation for the coal and ore mining area north of Mukho and help to develop the northern coastal area. Before 1945 this area was connected with the Railroad system which now belongs to North Korea. Having lost this connection, a new line from the South is necessary.

iv) The Nungeui Line (Kahang-Yuijongbu, 5.4 km) will connect the existing lines and will provide better transportation in the suburban area north of Seoul.

v) The Kyungjun Line (Chinju-Sunchon, 80.5 km of which 40 km is included in the 1962-66 Program) will provide better transportation between the port of Pusan and the southwest area of the country by eliminating the long detour via Taejon; this will substantially decrease the turnaround time of freight cars and speed up transportation.

b) Double Tracking of the Seoul-Inchon Line

The Seoul-Yongdongpo section (7 km) of this line already has double track. Doubling the remaining 32 km to Inchon is needed for the commuter traffic from new housing areas; these have been developed to alleviate the over-crowded housing conditions in Seoul.

c) Motive Power and Rolling Stock

i) 100 diesel electric locomotives are needed to replace the 268 serviceable standard gauge steam locomotives, of which however, only 170 to 190 are actually in use. This would completely dieselize the Railway's standard gauge system in the near future, and steam traction would continue only on the 126 km narrow-gauge line with 8 locomotives; its future has not yet been decided. The number and types of diesel locomotives needed have been estimated by the Railway on the basis of the services rendered by the steam locomotives to be replaced and a study of the future linking of the services; these estimates appear reasonable. The greater availability of the 100 diesel locomotives will meet the increasing traffic demand during the Program period (for details see Annex 1).

Of the three types of locomotives (i) 15 locomotives of 1,850 hp are to be used for the hauling of heavy freight trains on the mountainous line from Seoul to Yongju and the Port of Mukho, which has gradients up to 1:30; (ii) 25 locomotives of about 1,300 hp are to be used for hauling trains from Seoul to Pusan; and (iii) 60 locomotives of about 875 hp are to be used on the remaining main and branch lines and for shunting services. The additional number and types of diesel locomotives will also make it possible to release existing diesel locomotives for duties which they can render most efficiently.

When further traffic increases after 1966 require additional motive power, a study should be made whether to purchase railcars or locomotives. Railcars could be used to separate passenger and freight traffic of mixed trains, thus speeding passenger services and making available a number of existing locomotives for freight services.

ii) Procurement of 115 passenger cars (40 second class and 75 third class cars) is needed to replace obsolete stock, particularly converted box cars now used for passenger traffic. The second-class cars will release obsolete second-class cars for temporary use as third-class cars. Additional third-class cars will be manufactured locally. (For details see Annex 2).

iii) Procurement of 800 coal cars in 1962-63 and 200 in 1965 is necessary to meet the demand for coal transport which will increase at a rate of 600,000-800,000 tons per year even if allowance is made for the decreasing use of coal by the Railroad with its forthcoming dieselization. In addition, it will be necessary to manufacture a total of 800 coal cars locally in 1963-66 and 400 annually thereafter to meet increasing traffic demands and replace obsolete cars. (For details of the estimate see Annex 3 and Table No. 9).

iv) The local manufacture of 400 passenger cars and 1,800 freight cars (including the 800 coal cars mentioned above) is necessary to meet traffic demands in excess of those that can be met by imports. (A detailed statement of the number of passenger and freight cars needed in 1962-66 and thereafter is presented in Annexes 2 and 3). The production of freight

cars should start at a rate of 300 per year in 1963, increase to 700 cars in 1966 and continue thereafter at an annual rate of 800 cars (400 coal cars, 300 box cars and 100 other cars). Also as part of the Program, 500 wooden freight cars will be furnished with steel bodies and 325 others completely rebuilt to reduce uneconomic maintenance costs.

d) Improvement of Facilities

To facilitate local manufacture of rolling stock, and thus save foreign exchange, it is necessary to rehabilitate some buildings in the Inchon workshop and to purchase additional machine tools and equipment. The workshop has ample space but not all war damage has been repaired. The Program also provides for improvement of stations and marshalling yards, communication and signalling facilities, power plants, and transshipment facilities at the port of Mukho. Another major item of the Program is the local production of 1.8 million pre-stressed concrete ties and 7,000 concrete telecommunications poles. Moulds and reinforcement steel and some machinery will be imported, but cement and gravel will be produced locally. Since there is very little timber in Korea and since concrete ties and poles last about twice as long as wooden ones, the use of concrete is very economical.

C. Financial Aspects of Revised Program

58. The total estimated cost of the revised Five-Year Program which is considered feasible and economically justifiable is Hw 194.0 billion. To help finance the foreign exchange cost of US$59.8 million equivalent, the Government has a reasonable anticipation at this time of receiving about US$17 million from AID and US$14.0 million from IDA, or a total of US$31.0 million. Out of its own foreign exchange resources, it has already committed US$3.5 million, so that additional foreign exchange of US$25.3 million will have to be obtained during the next 4½ years, primarily for the foreign exchange costs of new line construction, improvement of facilities, and procurement and local production of passenger and freight cars. This should not present unreasonable difficulties, especially since US$17.7 million will not be needed till after 1963; however, an additional US$7.7 million will be required before then. If these additional funds are not obtained in time, the Program would have to be stretched out somewhat, which, however, would not seriously affect the parts for which funds are expected to be available.

59. During 1962-66 period, the Railroad will have to make amortization payments of Hw 1.4 billion on its existing loan to the Bank of Korea and Hw 6.6 billion for funds to be obtained from AID and IDA. This assumes that the Railroad Special Account would have to repay advances from the IDA credit over a period of 25 years beginning in 1964 (as provided in the Credit Agreement), and from the AID loan over 15 years, even though the Korean Government will receive longer terms. These payments, plus the costs of the revised Five-Year Program will total Hw 202.0 billion.

60. The sources of the funds to finance this expenditure are summarized below (for details see Table No. 10):

Railways Funds	Hw billions	
Net Income	15.4	
Depreciation	56.4	
Subtotal		71.8
General Account (See para. 42 and Table No. 12)		50.7
Anticipated Loan Funds		
IDA	18.2	
AID	22.1	
Subtotal		40.3
Total Funds Available		162.8

The estimated availability of funds on this basis indicates a deficiency of Hw 39.2 billion to finance the revised investment Program and the amortization. To finance most of this deficit, the Korean Government has agreed to an increase in freight rates of about 25% as of June 1, 1963; to raise revenues during the period by about Hw 31.5 billion.

61. In addition, however, Table No. 10 indicates that the Railroad will be confronted with an important financing problem already in 1962 with available funds about Hw 16.0 billion less than needed. This will require an early loan by the Government to the Railroad. An additional loan of Hw 4.0 billion will be needed in 1963. The funds that would become available from these loans and the 1963 freight rate increase will also permit a necessary increase in working capital.

62. The ability of the Railroad to provide from revenue the sum of Hw 71.8 billion depends on the volume of traffic, the control of operating expenses, and a rate and fare policy by which wage and other cost increases are promptly offset by rate and fare increases. Past performance clearly shows a steady growth of traffic (see Tables No. 3 and 4). The operating ratio, however, has remained virtually stable with increases in productivity offset by wage and price increases, which, in turn were not sufficiently balancedby rate and fare increases to avoid losses in most years.

63. The estimate of net operating revenues for 1962 - 1966 is summarized below (for details see Table No. 6):

	1962	1963	1964	1965	1966
		(Billions of Hwan)			
Operating Revenues	68.2	74.6	79.3	83.8	88.8
Operating Expenses (including depreciation)	71.7	74.6	73.3	73.5	76.9
Net Operating Revenues (or Loss)	(3.5)	0.0	6.0	10.3	11.9
Operating Ratio (%)	105	100	93	88	86

The estimate assumes that sharply increased productivity from dieselization and other investments will limit the increase in operating expenses to about 7 percent between 1962 and 1966, even though operating revenues are estimated to increase nearly 30 percent. This would permit a decline in the operating ratio from 105 to 86 during this period. Since this favorable result will not be achieved if the Government permits the increased productivity to be nullified by inflation on the cost side without timely compensatory rate and fare increases, the Government has agreed to offset all increases in present wages or prices of supplies and materials promptly by increases in rates or fares.

64. The Railroad anticipates a more favorable financial position than the one presented in this report. Firstly, it anticipates a greater increase in freight traffic; this is discussed below in paragraph 70. In addition, it envisaged that the exceptionally favorable terms of the AID and IDA credits would accrue to it, rather than the Government in general. As a result, it assumed that the Railroad will repay the IDA credit over 50 years at 1 percent interest beginning in 1973 and the AID loan over 15 years at 3 percent interest beginning in 1962. Since the Railroad should be operated on a more commercial basis than indicated by these terms, - especially those of the IDA credit, - IDA has assumed a 5-3/4 percent interest rate on these loans and terms of 15 years for the AID loan and 25 years for the IDA credit. The Government has agreed to these terms for the IDA credit.

65. The burden of debt service for the Railroad would be tolerable even on the basis of the commercial terms suggested in the previous paragraph. The maximum annual amount of interest payable would be Hw 3.5 billion in 1964. Amortization of principal would remain relatively stable at Hw 4.5 billion from 1964 on. The highest total debt service would be He 8.0 billion in 1964. Times interest earned would increase to 4.0 by 1966, and the debt service cover would increase from a low of 2.2 in 1964 to 3.3 by 1966 (see Table No. 11).

66. The above analysis makes it clear that even the revised Program will require a major financial effort by the Railroad. The original Program which would require nearly Hw 50 billion more (allowing for contingencies, which the Program had not made), including an additional US$25 million in foreign exchange, does not therefore seem practical.

D. Economic Justification

67. The Bank's report on "The Economy of the Republic of Korea", February 5, 1962 (Report No. FE-22) concluded that further improvement and expansion of the railroad "are necessary for the efficient handling of a greatly increased volume of traffic". It mentioned specifically that the needed increase in coal production (see paragraph 71 below) depends on the extension of the railway network and the expansion and modernization of the freight car fleet. "Major investments in the railroad, in particular in relation to the coal expansion program, appear to be of high priority."

68. Considering the regions served by the Railroad, the commodities it carries, and the passenger services it provides, the bulk of its traffic is of a kind which can be provided more economically by rail transport than by other means. The rail network is the only one which connects all parts of the country with Seoul and Pusan, the two largest commercial centers. Natural conditions severely limit river transport. The highway network is being developed only slowly and most of it is unsuitable for heavy traffic or all-weather service.

69. As far as railway passenger traffic is concerned, it would appear conservative to assume an increase of about 7 percent annually between 1962 and 1966, compared with an increase of 8 percent from 1955 to 1961. This is also generally consistent with the estimate of the Railroad.

70. As for railway freight tonnage, our estimate of growth during the next five years is about 32 percent, compared with a 40 percent increase during the last five years. The Railroad's estimate is very similar through 1964, but diverges substantially thereafter, with the Railroad assuming a major spurt in coal production in 1965. In view of the great deal of exploratory work needed to achieve such a spurt, the difficult administrative problems involved in getting many small mines to merge for greater efficiency and expanded production, and the shortage of capital, we anticipate a steadier growth in coal output. Even though an expansion of coal output from 5.8 million tons in 1962 to 9.0 million tons in 1966 would be a respectable achievement, the nearly 60 percent increase involved is substantially less than the 143 percent increase between 1957 and 1961 (when the absolute amounts were smaller), and accounts for the over-all smaller freight growth anticipated. Nevertheless, the proportion of coal in the total commercial revenue freight will increase, accounting for about 55 percent by 1966.

71. Without improvement of Korea's anthracite coal industry as the major source of energy, the industrial development of the country cannot proceed effectively. An analysis of energy demand prepared by the Government, and generally approved by its foreign technical advisers, indicates an increase in the effective demand for anthracite from about 5.4 million tons to 11.9 million tons between 1960 and 1966; during that period anthracite's share of energy will increase from 72 to 78 percent, excluding wood and straw, which account for about one-half of the energy supply. In 1960, the total energy consumed per person was only about 0.6 tons of anthracite equivalent. The Government estimates that while the relative share of anthracite used for civilian and Government purposes will decline in the coming years, the proportion used by power plants and industry will more than double, - from 20 percent in 1960 to 44 percent by 1966. In terms of need, rather than effective demand, an even further increase in coal output would be desirable in order to replace wood as the major source of civilian heat energy; the deforestation of Korea is accelerating the erosion of the land, which presents one of the most serious problems to Korean agriculture. The lack of coal for civilian purposes is also reflected, for example, in the failure to heat schools and government offices adequately or at all.

72. Of the other major commodities carried by the railroad, cement is expected to nearly double between 1961 and 1966, - from about 0.6 to 1.1 million tons. The increased domestic production will avoid the need for imports, unless a hydro-electric plant is built; this, however, would involve merely a one-time shipment. Fertilizer, now the second largest item, is not expected to increase, with greater domestic production offset by lower imports, and the expanding requirements met by better fertilizers not involving increased quantities. Petroleum imports will continue to be kept down by Government restrictions. As for iron ore, we have accepted the Government's estimate of a modest increase from 420,000 tons to 520,000 between 1961 and 1966; it is, however, possible that the increase may be much more substantial.

73. The railroad Program, in addition to its important contribution to the industrialization of Korea described above, will also permit major reductions in costs. Largely because of the complete dieselization, it is estimated that while passenger-kms and ton-kms will each increase by about 28 percent between 1962 and 1966, operating expenses will go up by only 7.5 percent. In the absence of those parts of the investment Program reducing costs, operating expenditures in 1966 would be nearly Hw 15 billion higher. As shown in Annex 1, the rate of return on the dieselization alone is more than 30 percent. In addition, there will be substantial savings in foreign exchange, e.g. US$1.7 million annually on fuels and lubrication.

E. The Project

74. The Project covers the most urgent part of the revised 1962-66 Railroad Investment Program and includes (a) procurement and manufacture of rolling stock during 1962 and 1963, (b) completion of the Hwanji line in 1963, and (c) the establishment of a modern accounting and statistical system. It does not include other new line construction, improvement of railway facilities,

and the contemplated dieselization during this period because any delay in these items will not seriously affect the Project and because the necessary foreign exchange is not yet assured.

75. The cost of the Project will be Hw 35.3 billion (US$27.2 million equivalent), of which Hw 15.6 billion is in local currency and US$15.9 million in foreign exchange. These amounts include 5 percent contingencies on foreign exchange expenditures and 15 percent on local expenditures. The Project accounts for about 27 percent of the foreign exchange cost of the whole Program and 18 percent of the local expenditures.

76. Of the foreign currency cost of the Project, the IDA credit will finance the procurement of 115 passenger cars, 800 coal cars, and US$100,000 for financial consultants:

1. Foreign Exchange

IDA	US$14.0 million equivalent
Korean Foreign Exchange	US$ 1.9 " "
Total	US$15.9 million equivalent

2. Local Currency

Railroad Special Account	Hw 13.6 billion
Government General Account	Hw 2.0 "
Total	Hw 15.6 billion

77. The proposed List of Goods would be:

	US$ million
115 passenger cars	6.0
800 coal cars	7.2
Financial consultants	0.1
Contingencies	0.7
Total	14.0

78. Orders for all passenger cars and coal cars financed by IDA will be placed in 1962 or early 1963 on the basis of international competitive bidding. All procurement will be completed by the end of 1963.

IV. CONCLUSIONS AND RECOMMENDATIONS

79. In spite of some organizational deficiencies, the management and operation of the Railroad are satisfactory, and its financial position can be made sound by rate and fare increases. Its 1962 - 1966 Investment Program, scaled down as herein recommended, is well planned and engineered, and its implementation is of high priority for the economic development of Korea. Suitable procurement methods would be employed. Accordingly, the Project provides a suitable basis for a development credit of US$14.0 million equivalent to the Government of Korea.

80. During the negotiations the Government has agreed to a number of conditions to help assure the Project's economic and financial success. The most important of these include:

i) The Government will review the Investment Program and before making any investment on certain specified items, will inform IDA and give it an opportunity to comment.

ii) The Government will appoint a chief executive officer responsible for the day-to-day operations of the Railroad.

iii) The Government will establish before June 30, 1963, a separate office in the Ministry of Transportation which will be responsible only for the management and operation of the railroad. Promptly after the establishment of the accounting system included in the Project, the Government will make the Railroad a separate agency.

iv) The Railroad will maintain separate accounts reflecting its receipts and expenditures and capital transactions in accordance with generally accepted commercial accounting principles.

v) The Government will employ competent consultants to assist in establishing a modern accounting and statistical system.

vi) The Government will increase freight rates by June 1, 1963, sufficiently to raise freight revenues by 25 per cent. In addition, it will offset any increase in present wages or prices of supplies and materials promptly by rate or fare increases. Upon establishment of a sound accounting system, it will set rates and fares at a level which will provide a reasonable return on the investment in the Railroad.

vii) The Railroad will repay to the Government the proceeds of the credit over 25 years at 5 3/4 per cent interest.

Details of Dieselization Program

I. Utilization of Diesel Locomotives

The Railroad operates at present a standard gauge locomotive fleet as follows:

	Type	Number	
		Total Assigned	Average in use
Diesel locomotives	1,750 hp	29	29
	875 hp	52	52
	850 hp shunter	14	14
Total Diesels		95	95
Steam locomotives	Heavy	128	96
	Medium	72	50
	Light	40	27
Total Steam		240 *	173

The Railroad plans to purchase the following diesel locomotives:

Type	Number
1,850 hp	15
1,310 hp	25
875 hp	60
Total	100

The 875 hp diesel locomotives will replace light and medium steam locomotives; the 1,310 hp ones will replace medium and heavy steam locomotives, and the 1,850 hp locomotives will be used for heavy duty wherever the Railroad's heaviest steam locomotives do not render satisfactory service. This is mainly for heavy coal trains on the Central Line from Seoul to Yongju and its extension to the port of Mukho, which has gradients up to 1:30. The heavy diesel locomotives are and will continue to be used on the double track main line Seoul-Pusan, which permits longer freight trains than on the single track lines.

Based on a study of train movements to assure maximum utilization of the diesels, the Railroad plans to use the 100 new diesel locomotives for the following services:

* Plus 28 steam locomotives stored; total 268 serviceable steam locomotives (See Table No. 2).

Linking of Services for new Diesel Locomotives

(P = Passenger. F = Freight. M = Mixed trains. SW = Switching Service)

Type	Number Required	Service	Replacing Steam locos a/	Replacing Diesel locos
1,310 hp	7	P. Seoul - Pusan	21	-
	7	P. Seoul - Mokpo	10	3 (875 hp)
	6	P. Seoul - Yongju - Pusan	-	6 (875 hp)
	2	P. Iri - Yosu	3	-
	3	M. Taejon - Songjongni	5	-
	25		39	9
Released 875 hp	7	P.& M. Taejon - Iri		
		Taejon - Seoul	20	-
	2	P. Pusan - Taejon	6	-
	9		26	-
New 875 hp	7	P.& M. Kyongju - Pusan	21	-
		" Kyongju - Pohang		
		" Kyongju - Taegu		
	7	" Masan - Chinju	18	-
		" Masan - Pusan		
	3	" Seoul - Nungok-Uijongbu	-	-
	3	SW. Taejon	3	-
	12	SW. Seoul	23	-
	5	P.& F. & SW - Iri	13	-
	4	P.& F. & SW - Mokpo	15	-
	7	P.& F. & SW - Kwangju	14	-
	7	P.& F. & SW - Sunchon	18	-
	5	P.& SW. Pukpyong - Cholam	28	-
	60		153	
1,850 hp	9	F. Seoul - Cholam-Mokpo	-	-
	6	F. Seoul - Pusan	22	-
	15		22	
TOTAL	109		240	9

a/ Figures include serviceable locomotives which are in surplus.

The 173 steam locomotives in use will be replaced by 100 diesel locomotives, which is a normal proportion. The total number of 100 diesel locomotives appears therefore to be justified. The total hauling capacity of all locomotives available in 1961 compared with that in 1964, the first year of complete dieselization, is as follows:

	Train - km		Engine - km		Converted-car-km a/	
	Total (million)	Per serviceable engine (000)	Total (million)	Per serviceable engine (000)	Total (million)	Per engine (km)
			Actual Results in 1961			
175 Steam	7.8	42.6	11.9	68.3	80.0	6.7
93 Diesel	11.1	119.2	14.0	150.6	178.1	12.7
Total	18.9		25.9		258.1	
			Capacity in 1964			
190 Diesel	22.7	119.2	28.6	150.6	363.0	12.7
Increase Total	3.8		2.7		104.9	
Increase %	20.1		10.4		40.6	

a/ KNR shows in its statistics the number of "converted car kilometers" instead of "gross ton-kilometers hauled". However, converted car-kilometers are in direct proportion to the gross ton-kilometers hauled and may therefore serve as a measure for all operating movements.

The table shows that the procurement of 100 diesel locomotives is not only sufficient to replace the steam locomotives still in use, but would also permit a 20% increase in train-kilometers and of 40% overall carrying capacity. This corresponds to the estimated traffic increase in 1966.

The statements of the Railroad do not provide details of the further use of the existing diesel locomotives, in particular of the 1,750 hp locomotives for heavy duty. Since the utilization study for the new locomotives is not specific in showing the use of the 1,850 hp locomotives, the final breakdown of the hundred locomotives by duty classes and types should be the subject of a special study.

II. Cost Reductions from Dieselization

The Railroad has already experienced some of the economies of diesel traction in comparison to steam. Diesel traction has proved much less expensive than steam traction even though coal is produced locally. Korean Anthracite,

because of its small size, is suitable for locomotive use only after it has been pressed into briquets with the additional imported coal tar pitch. One hundred steam locomotives have been converted to oil burning.

In 1961 the Railroad's fuel and lubrication consumption was as follows:

	Local Cost (hw-billion)	Import Cost ($ million)	Tax (hw-billion)	Total Cost ($million equivalent)
I. Diesel Locomotives				
Diesel Fuel 13.3 million gallons	-	1.30	0.83	1.94
Lubrication Oil 243,000 gallons	-	0.14	-	0.14
Subtotal diesel	-	1.44	0.83	2.08
II. Steam Locomotives				
Fuel Oil 36.5 million gallons	-	2.31	1.36	3.36
Briquets 285,000 tons	3.30	1.54	0.20	4.23
Lubrication and grease	-	0.11	0.07	0.16
Subtotal Steam	3.30	3.96	1.63	7.75
Grand Total	3.30	5.40	2.46	9.83

In 1961, the diesel locomotives rendered 14.0 million engine-kms, and the steam locomotives 11.9 million engine-kms. Thus the average fuel and lubrication cost for diesel locomotives was US$0.148 equivalent per engine-km, less than one-fourth that of US$0.652 equivalent per engine-km for steam locomotives.

If the remaining steam locomotives would be replaced by 100 diesel locomotives, savings would be as follows:

	$ Equivalent per year
I. Operating costs of existing steam locomotives:	
1. Fuel and lubrication	7,750,000
2. Maintenance and repair	660,000
3. Parts	200,000
Subtotal	8,610,000
4. Depreciation on residual value	400,000
Total Steam	9,010,000
II. Operating costs of 100 additional diesel locomotives:	
1. Fuel and lubrication	2,250,000
2. Maintenance and repair	400,000
3. Parts	400,000
Subtotal	3,050,000
4. Depreciation (5%)	850,000
Total Diesel	3,900,000
Savings:Diesel versus Steam	$5,110,000

This makes no allowance for important additional savings from closing down all facilities only needed for steam traction, such as steam running sheds, water and coaling stations, etc. These cannot be estimated since the railroad does not have cost accounting. But even without them, the savings on operating costs for the 100 new diesel locomotives bring a return of about 30 per cent on the 17 million dollar investment in diesels. The savings in foreign exchange will also be substantial. For example, on fuel and lubrication the foreign exchange costs are estimated at US$3.96 million annually for the existing steam locomotives, compared to only $2.25 million for the new diesels.

Passenger Car Requirements

The following table shows the Railroad's present passenger car situation, anticipated retirements and additions, and the situation at the end of the Program period:

Type	March 1962	Retirements 1962-66	Additions 1962-1966 Imports	Local Manufacture	Total	Stock at End of 1966
Regular Passenger-carrying cars						
2nd Class	70	30[c]	40	-	40	80
2nd & 3rd class combined	26	5	-	-	-	21
3rd class	526	52	75	430[d]	505	979
3rd class converted box cars	231[b]	231[b]	-	-	-	-
Sub-total Passenger-carrying stock	853	318	115	430	545	1,080
Special cars[a]	81	1	-	-	-	80
Passenger, Baggage & Mail combined	55)					
Baggage & Mail combined	78)	9	-	-	-	124
	)133					
Total Passenger Stock	1,067	328	115	430	545	1,284

a/ 10 official, 40 sleeping, 14 dining, 1 first-class, and 16 hospital cars.
b/ Total of 463 cars counted only one-half because of lower capacity.
c/ To be down-graded to 3rd class.
d/ 400 cars manufactured locally plus 30 cars down-graded from 2nd class.

The 115 cars to be imported (40 second-class and 75 third-class cars) are scheduled for procurement from the IDA credit in 1962-63. The table indicates that the regular passenger carrying stock will increase during the Program period by 227 cars, or 26% compared to an anticipated increase in passenger traffic of 28%. However, to meet traffic demands and to alleviate overcrowding of trains, the Railroad should plan to continue local manufacture of passenger cars or further procurement after 1966.

Freight Car Requirements

I. Coal Cars

The Railroad has 3,750 standard gauge Gondola cars suitable for coal traffic. 384 of them are hopper cars, of which about 40 are mainly for the Railroad's own ballast transport. The following table shows the coal and other traffic on Gondola cars and their utilization during the past three years:

		1959	1960	1961
Coal Traffic				
Commercial Traffic	(000 tons)	3,540	4,368	5,060
KNR	(000 tons)	851	706	638
Total	(000 tons)	4,391	5,074	5,698
Cars Loaded in Coal Traffic				
Commercial traffic	(000)	106	131	151
Average load commercial traffic	(tons)	33.4	33.4	33.8
KNR	(000)	26	22	19
Average load KNR	(tons)	32.4	32.1	32.6
Total cars loaded	(000)	132	153	170
Average load total traffic	(tons)	33.3	33.3	33.5
Total Gondola Cars Loaded				
All traffic	(000)	176	183	212
Gondola cars loaded other than coal traffic	(000)	44	30	42
" "	(%)	25	16.4	19.8
Gondola cars available, annual average		2,790	2,960	3,184
Gondola cars in coal traffic, annual average		2,090	2,470	2,560
Gondola cars in other traffic		700	490	624
Tons of coal per car and year		2,100	2,060	2,230

The revised traffic forecast (see paragraph 69) estimates an increase of commercial coal traffic to 9 million tons in 1966. With the forthcoming dieselization, KNR's departmental coal traffic will decrease from 638,000 tons in 1961 to about 100,000 tons, which will still be needed for purposes other than locomotive burning. The coal traffic may thus be expected to develop as follows:

	1962	1963	1964	1965	1966	1967
Commercial traffic	5.8	6.6	7.4	8.2	9.0	9.8
KNR	0.6	0.4	0.1	0.1	0.1	0.1
Total	6.4	7.0	7.5	8.3	9.1	9.9

Table No. 9 shows the coal car requirements for the years 1961-1967. As in the past, it is assumed that 20 percent of the Gondola cars will be used for traffic other than coal. This allows a certain increase of this traffic too. Throughout the 1962-1966 Program period, except in 1964, the existing stock will be unable to meet all demands of coal transport, so that retirement of some obsolete stock should be postponed.

In 1963, 800 coal cars to be purchased from the IDA credit will be put into operation, and local production will also start. In 1964 there will be a small surplus in capacity which will be eliminated after 1964 by the increase of coal traffic; unless local production of coal cars is increased to a rate of 400 annually by 1966, there would be a serious deficit beginning in that year.

The conclusions are: (1) immediate procurement of 800 coal cars is necessary for service starting during 1963; (2) procurement of 200 additional coal cars is needed in 1965; (3) local production of 800 coal cars during the Program period is justified; and (4) further increases of local production of coal cars are necessary beyond the Program period.

II. Box Cars

The Railroad owns at present 3,935 standard gauge box cars. In addition, 463 box cars are being used temporarily as passenger cars, of which 400 will become available for freight traffic with the forthcoming procurement and local manufacture of passenger cars; the remaining 63 are obsolete and due for scrapping. The prospective situation for box cars during the Program period is estimated as follows:

	1962	1963	1964	1965	1966	1967
Number of cars beginning of year	3,935	3,935	4,135	4,335	4,435	4,535
To be scrapped	-	100	100	100	100	100
Balance	3,935	3,835	4,035	4,235	4,335	4,435
Manufacture	-	100	100	200	200	300
Reconversion	-	200	200	-	-	-
Balance at end of year	3,935	4,135	4,335	4,435	4,535	4,735
Average number of cars during year	3,935	4,035	4,235	4,385	4,485	4,635
Average annual increase	-	100	200	150	100	150
Percentage increase	-	2.5	5.0	3.5	2.3	3.3

This modest increase in the box car stock compares fairly well with the annual increase of 3 percent for traffic other than coal.

III. Tentative Program for Local Manufacture of Freight Cars

The Railways' Program call for the local manufacture of 700 freight cars annually beginning in 1963. As explained in paragraph 53, it would be desirable to reduce this program along the following lines:

Type	1963	1964	1965	1966	Total 1963-1966	1967 and following years
Gondola	100	100	200	400	800	400 minimum
Box	100	100	200	200	600	300 minimum
Other types	100	120	80	100	400 a/	100
Total	300	320	480	700	1,800	800

a/ Includes: 70 flat cars, 140 tank cars, 70 refrigerator cars and 120 cabooses.

The table shows that the Railroads' freight car manufacturing program is generally justified after 1965. If it should prove impossible to increase local freight car production to an annual rate of 700 by 1966, additional imports of freight cars may become necessary in 1966 and thereafter.

KOREAN NATIONAL RAILROAD

Summary of Selected Operating Statistics

	1955	1956	1957	1958	1959	1960	1961	Remark: Respective Data per Engine available: 1960	1961
I. Traffic									
1. Passenger-km (million)	3,712	4,049	3,435	4,172	4,540	4,935	5,371		
2. Net Ton-km (million)	2,060	2,274	2,570	2,658	3,071	3,282	3,488		
3. Traffic-Units (million)	5,772	6,323	6,005	6,830	7,611	8,217	8,859		
Traffic-Units = ton-km + passenger-km.									
II. Operation									
1. Train-km Steam (000)	13,375	14,688	13,780	9,412	8,766	7,529	7,800		
Train-km Diesel (000)	282	332	1,988	5,858	7,794	10,560	11,100		
Train-km Railcar (000)	150	349	411	533	645	696	1,000		
Train-km Total (000)	18,807	15,369	16,179	15,803	17,225	18,785	19,900		
2. Engine-km Steam (000)	22,561	21,554	20,701	15,174	13,384	11,588	11,900		
Engine-km Diesel (000)	521	431	2,301	6,941	9,737	12,898	14,000		
Railcar-km (000)	150	368	447	585	719	762	1,100		
3. Number of Engines in fleet									
Steam	522	523	516	479	458	457	350	251	215
Diesel	4	4	34	47	69	95	95	92	92
Railcars	10	12	14	14	14	10	16	9	15
Total motive power units	536	539	564	540	541	562	461	352	322
4. Engine-km per Engine-Day in fleet									
Steam	118	113	110	91	80	70	94	127	160
Diesel	357	295	186	406	387	373	402	381	411
Railcar	41	61	87	114	140	210	220	233	251
5. Traffic-units per motive power-unit in fleet (million)	10.8	11.7	10.7	12.7	14.1	14.6	19.2	23.4	27.5
6. Traffic units per train-km	307	412	373	432	442	437	446		
7. Passenger-km per passenger-car in fleet[a] (million)	4.6	4.4	3.6	4.3	4.5	4.6	4.9		
8. Passenger-km per passenger-car-km[a]	61.8	60.2	48.1	49.3	49.3	47.6	48.9		
9. Net ton-km per freight car in fleet (000)	174	199	247	273	319	350	370		
10. Available freight car days	3,096	2,754	2,500	2,420	2,373	2,255	2,480		
11. Freight cars loaded (000)	363	382	419	430	477	496	536		
12. Average turn-around time of freight cars, days	8.5	7.2	6.0	5.6	5.5	4.6	4.6		
13. Average load of freight cars, tons	28.6	28.9	28.7	28.1	28.8	29.1	28.1		
III. Staff									
1. Number of employees	n.a.	31,092	29,297	27,234	26,798	26,845	26,316		
2. Traffic-Units per employee (000)		203	205	247	284	306	298		

a/ Converted box cars counted only one-half.

Table No. 1

KOREAN NATIONAL RAILROAD

RAILWAY PROJECT

Statement of Motive Power and Rolling Stock (March 1962)

	Total	To be scrapped	Service-able	Under or awaiting repair	Available for use	Available stock in percent of serviceable stock (%)	Remark: Available but not in use
I. Locomotives							
Steam Standard G Coal burning	238	70	168	58	110		32
Oil burning	100	-	100	3	97		-
Subtotal Standard G	338	70	268	61	207		32
Narrow G Coal burning	12	1	11	3	8		2
Total Steam Locomotives	350	71	279	64	215	77	34
Dieselelectric							
Standard G 1,750 hp	29	-	29	1	28		
875 hp	52	-	52	2	50		
850 hp shunters	14	-	14	-	14		
Total Dieselelectric Locomotives	95	-	95	3	92	97	-
II. Diesel Railcars							
Standard Gauge	29	-	29	-	29	100	-
Narrow Gauge	3	1	2	-	2	100	-
III. Passenger Cars							
Standard Gauge, 1st Class and Special	81	2	79	8	71		
" , 2nd Class & 2nd & 3rd Class	96	4	92	4	88		
" , 3rd Class	526	17	509	21	488		
" , Baggage and Mail	133	6	127	10	117		
" , 3rd Class converted Box Cars	463	*/	463	3	460		
Subtotal Standard Gauge	1,299	29	1,270	46	1,224	97	-
Narrow Gauge , 3rd Class	9	-	9	2	7	78	-
Total Passenger Cars	1,308	29	1,279	48	1,231	96	-
IV. Freight Cars							
Standard Gauge, Box Car	3,935	19	3,916	233	3,683		
Gondola and Hopper	3,750	4	3,746	101	3,645		
Flat	918	4	914	76	838		
Tank	545	-	545	3	542		
Refrigerator	158	5	153	25	128		
Caboose	208	2	206	48	158		
Subtotal	9,514	34	9,480	486	8,994	95	-
Narrow Gauge, Box Car	110	-	110	1	109		
Gondola	96	-	96	3	93		
Subtotal	206	-	206	4	202	98	-
Total Freight Cars	9,720	34	9,686	490	9,196	95	-

*/ To be reconverted into box cars: 400
To be scrapped : 63
463

Table No. 2

KOREAN NATIONAL RAILROAD

Freight Traffic, 1955 - 1966
(millions of tons)

	Actual							Estimate				
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Revenue Freight												
Commercial Freight												
Coal	1.3	1.5	2.1	2.4	3.5	4.4	5.1	5.8	6.6	7.4	8.2	9.0
Fertilizer	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Cement	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.7	0.9	1.1
Rice	0.4	0.4	0.4	0.4-	0.4	0.6	0.5	0.6	0.7	0.7	0.8	0.8
Ore*	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.4	0.4	0.4	0.5	0.5	0.5
Timber	0.4	0.5	0.6	0.5	0.6	0.4	0.3	0.3	0.3	0.3	0.3	0.3
Petroleum	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4
Other	2.0	2.2	2.8	2.9	3.1	3.2	3.1	3.1	3.2	3.3	3.3	3.4
Sub-total	5.0	5.6	7.0	7.3	9.0	10.2	11.1	12.0	13.1	14.1	15.1	16.3
Military Freight	4.0	4.0	3.7	3.4	3.2	2.8	2.9	2.8	2.8	2.8	2.8	2.8
Sub-total, Revenue Freight	9.0	9.6	10.7	10.7	12.2	13.0	14.0	14.8	15.9	16.9	17.9	19.1
Railroad Service Freight	1.4	1.4	1.3	1.4	1.5	1.4	1.4	1.4	1.4	1.3	1.2	1.2
Grand Total	10.4	11.0	12.0	12.1	13.7	14.4	15.4	16.2	17.3	18.2	19.1	20.3

* For 1955 - 1960 included under "Other".

Table No. 3

KOREAN NATIONAL RAILROAD

Passenger Traffic, 1957-1966

	Year	Millions of Passengers: 3rd Class	1st and 2nd Class	Students	Commuters	Military	Total	Billions of Passenger-kms	Average Passenger-km per Passenger
	1955	32.6	0.5	19.0	1.0	4.2	57.3	3.7	64.8
	1956	39.8	0.7	20.7	1.5	3.6	66.3	4.0	61.1
	1957	29.2	0.7	18.3	1.3	3.9	53.4	3.4	64.2
Actual	1958	43.6	1.2	19.4	2.4	3.6	70.1	4.2	59.5
	1959	49.1	1.4	16.3	1.3	3.4	71.5	4.5	63.5
	1960	54.2	1.5	15.9	0.9	3.2	75.7	4.9	65.2
	1961*	63.7	1.5	19.4	1.7	2.0	88.3	5.4	61.2
	1962						96.0	6.0	63.0
	1963						102.0	6.4	63.0
Estimate	1964						109.0	6.9	63.0
	1965						116.0	7.3	63.0
	1966						123.0	7.7	63.0

* The 1961 total is actual, but the composition is estimated

Table No. 4

Table No. 5

KOREAN NATIONAL RAILROAD

Balance Sheet, December 31, 1961
(billions of Hwan)

Assets	
Current Assets	
Cash - Deposits	2.3
Bonds	0.9
Receivables	1.7
Materials and Supplies	13.6
Sub-total	18.5
Net Fixed Assets	
Land	27.3
Buildings	22.9
Way - Structure	346.5
Facility for Communication and Electric Power	24.2
Machinery	10.8
Rolling Stock	135.3
Tools - Equipment	3.4
Sub-total	570.4
Total Assets	588.8
Liabilities	
Current Liabilities	
Accounts Payable	0.1
Accrued Income	-
Accrued Taxes	1.2
Contract Performance Bonds	0.8
Sub-total	2.1
Debt (Bank of Korea)	4.8
Capital (Government equity)	581.9
Total Liabilities	588.8

1961 Balance Sheet Ratios

1.	Current Ratio	8.8
2.	Liquidity Ratio	2.3
3.	Debt-Equity Ratio	0.008
4.	Liabilities (excl. Capital)/ Total Assets	0.012

KOREAN NATIONAL RAILROAD

Comparative Statement of Income and Profit, 1957-66
(Billions of Hwan)

	Actual					Estimate				
	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Operating Revenues										
Passenger	19.4	23.1	25.8	27.7	31.9	38.1	40.5	43.4	46.0	48.6
Freight 1/	6.6	12.5	14.2	14.9	24.1	29.1	33.0	34.7	36.5	38.3
All Other	0.5	0.5	0.7	1.7	1.3	1.0	1.1	1.2	1.3	1.4
Total	26.5	36.1	40.7	44.3	57.3	68.2	74.6	79.3	83.8	88.8
Operating Expenses										
Before depreciation 2/	24.0	33.2	34.2	39.2	50.0	62.0	63.9	62.0	61.5	64.2
Depreciation 3/	3.8	5.2	5.8	6.3	8.2	9.7	10.7	11.3	12.0	12.7
Total	27.8	38.4	40.0	45.5	58.2	71.7	74.6	73.3	73.5	76.9
Net Operating Revenues (or Loss)	(1.3)	(2.3)	0.7	(1.2)	(0.9)	(3.5)	0.0	6.0	10.3	11.9
Other Income	0.1	0.1	0.1	0.1	2.4	0.3	0.3	0.3	0.3	0.3
Gross Income (or Loss)	(1.2)	(2.2)	0.8	(1.1)	1.5	(3.2)	0.3	6.3	10.6	12.2
Fixed Charges (Interest, see Table 11)	-	-	0.1	0.2	0.1	0.1	1.0	3.5	3.2	3.0
Net Income (or Loss)	(1.2)	(2.2)	0.7	(1.3)	1.4	(3.3)	(0.7)	2.8	7.4	9.2
Operating Ratio (%)	105	106	98	103	102	105	100	93	88	86

Table No. 6

1/ Takes into account 25 percent increase in freight rates, June 1, 1962
2/ Makes allowance for wage and other cost increases in 1962.
3/ Calculated at one-seventh of gross operating revenues.

KOREAN NATIONAL RAILROAD

The Government's Railway Investment Program, 1962-1966
(amounts in million $ and million Hwan)

Item	1962 Foreign Exchange $ Equiv.	1962 Local Currency Hwan	1962 Total Hwan Equiv.	1963 Foreign Exchange $ Equiv.	1963 Local Currency Hwan	1963 Total Hwan Equiv.	1964 Foreign Exchange $ Equiv.	1964 Local Currency Hwan	1964 Total Hwan Equiv.	1965 Foreign Exchange $ Equiv.	1965 Local Currency Hwan	1965 Total Hwan Equiv.	1966 Foreign Exchange $ Equiv.	1966 Local Currency Hwan	1966 Total Hwan Equiv.	Total Foreign Exchange $ Equiv.	Total Local Currency Hwan	Total Hwan Equiv.	Proposed source for financing(x)
New Line Construction																			
1. Hwangji Line, 16.0 km (Tongni-Simpori and Hwangji - Paeksanni)	0.30	3,600	3,990	-	-	-	-	-	-	-	-	-	-	-	-	0.30	3,600	3,990	KFX and Railway Special Account
2. Kyungbuk Line, 58.6 km (Yungju-Chomchon)	0.70	2,300	3,210	0.70	2,300	3,210	0.60	2,300	3,080	-	-	-	-	-	-	2.00	6,900	9,500	" " General Account
3. Nungeui Line, 5.4 km (Kanung-Uijongbu)	0.04	80	132	0.03	60	99	0.03	60	99	-	-	-	-	-	-	0.10	200	330	" " Railway Special Account
4. Chungsun Line, 42.0 km (Hambaeck-Chungsun)	0.60	3,150	3,930	0.60	3,150	3,930	0.60	3,100	3,880	-	-	-	-	-	-	1.80	9,400	11,740	" " General Account
5. Tonghae Pukbu Line, 92.9 km (Okkae-Kangnung-Sokcho)	0.80	2,100	3,140	0.70	2,100	3,010	0.70	2,100	3,010	-	-	-	-	-	-	2.20	6,300	9,160	" Okkae-Kangnung Special Account Hwan 1.9 billion, Kangnung-Sokcho General Account Hwan 4.4 billion, and Special Account.
6. Kyungjun Line, 80.5 km (Chinju-Sunchon)	-	-	-	-	-	-	0.80	3,880	4,920	0.80	3,860	4,900	0.80	3,860	4,900	2.40	11,600	14,720	
Subtotal: New Line Construction	2.44	11,230	14,402	2.03	7,610	10,249	2.73	11,440	14,989	0.80	3,860	4,900	0.80	3,860	4,900	8.80	38,000	49,440	
Electrification and Double Tracking																			
7. Kyungin Line, 38.9 km (Seoul-Inchon)	-	-	-	2.00	1,150	3,750	1.90	1,150	3,620	1.90	1,150	3,620	1.90	1,150	3,620	7.70	4,600	14,610	KFX and Special Account
Motive Power and Rolling Stock																			
8. Procurement of 100 diesel electric locomotives	12.00	70	15,670	5.00	30	6,530	-	-	-	-	-	-	-	-	-	17.00	100	22,200	AID and Special Account
9. Procurement of 145 diesel railcars	-	-	-	2.35	25	3,080	2.35	25	3,080	2.35	25	3,080	2.35	25	3,080	9.40	100	12,320	Undecided
10. Procurement of 85 passenger cars	3.50	-	4,550	1.50	-	1,950	-	-	-	-	-	-	-	-	-	5.00	-	6,500	KFX
11. Procurement of 100 passenger cars	2.50	-	3,250	2.50	-	3,250	-	-	-	-	-	-	-	-	-	5.00	-	6,500	IDA
12. Procurement of 500 coal hopper cars	2.25	-	2,925	2.25	-	2,925	-	-	-	-	-	-	-	-	-	4.50	-	5,850	German Loan
13. Procurement of 555 coal hopper cars	2.50	-	3,250	2.50	-	3,250	-	-	-	-	-	-	-	-	-	5.00	-	6,500	IDA
14. Local production of 400 passenger cars	0.30	3,360	3,750	0.30	3,360	3,750	0.30	3,360	3,750	0.30	3,360	3,750	0.30	3,360	3,750	1.50	16,800	18,750	KFX and Special Account
15. Local production of 2,800 freight cars	-	-	-	1.40	4,500	6,320	1.40	4,500	6,320	1.40	4,500	6,320	1.40	4,500	6,320	5.60	18,000	25,280	" " General "
16. Conversion of 500 wooden freight cars to steel bodies and rebuilding of 325 cars	-	650	650	-	650	650	-	-	-	-	-	-	-	-	-	-	1,300	1,300	Special Account
Subtotal: Motive Power & Rolling Stock	23.05	4,080	34,045	17.80	8,565	31,705	4.05	7,885	13,150	4.05	7,885	13,150	4.05	7,885	13,150	53.00	36,300	105,200	
Improvement of Railway Facilities																			
17. Improvement of workshops to permit annual construction of 100 passenger and 700 freight cars	1.04	200	1,552	1.04	200	1,552	1.04	200	1,552	1.04	200	1,552	1.04	200	1,552	5.20	1,000	7,760	KFX and/or Loan & Special Account
18. Extension of tracks within yards or major industrial lines, reinforcement of tracks and improvement of safety facilities	0.20	800	1,060	0.20	800	1,060	0.20	800	1,060	-	-	-	-	-	-	0.60	2,400	3,180	KFX and Special Account
19. Installation and improvement of marshalling yards	-	-	-	0.18	630	864	0.18	630	864	0.17	620	841	0.17	620	841	0.70	2,500	3,410	" " " "
20. Extension of unloading facilities at the port of Mukho	0.10	20	150	-	-	-	-	-	-	-	-	-	-	-	-	0.10	20	150	" " " "
21. Improvement of power communication and signal facilities	0.04	520	572	0.04	520	572	0.04	520	572	0.04	520	572	0.04	520	572	0.20	2,600	2,860	" " " "
22. Improvement of Seoul Station	-	-	-	0.05	675	740	0.05	675	740	0.05	675	740	0.05	675	740	0.20	2,700	2,960	" " " "
23. Procurement of 1,800,000 prestressed concrete ties and of 7,000 prestressed concrete poles	0.84	4,100	5,192	0.84	4,100	5,192	0.84	4,100	5,192	0.84	4,100	5,192	0.84	4,100	5,192	4.20	20,500	25,960	KFX and/or Loan & Special Account
Subtotal: Improvement of Ry. Facilities	2.22	5,640	8,526	2.35	6,925	9,980	2.35	6,925	9,980	2.14	6,115	8,897	2.14	6,115	8,897	11.20	31,720	46,280	
SUMMARY																			
1-6 Subtotal: New Line Construction	2.44	11,230	14,402	2.03	7,610	10,249	2.73	11,440	14,989	0.80	3,860	4,900	0.80	3,860	4,900	8.80	38,000	49,440	
7 " : Electrification and Double Tracking	-	-	-	2.00	1,150	3,750	1.90	1,150	3,620	1.90	1,150	3,620	1.90	1,150	3,620	7.70	4,600	14,610	
8-16 " : Motive Power & Rolling Stock	23.05	4,080	34,045	17.80	8,565	31,705	4.05	7,885	13,150	4.05	7,885	13,150	4.05	7,885	13,150	53.00	36,300	105,200	
17-23 " : Improvement of Railway Facilities	2.22	5,640	8,526	2.35	6,925	9,980	2.35	6,925	9,980	2.14	6,115	8,897	2.14	6,115	8,897	11.20	31,720	46,280	
GRAND TOTAL	27.71	20,950	56,973	24.18	24,250	55,684	11.03	27,400	41,739	8.89	19,010	30,567	8.89	19,010	30,567	80.70	110,620	215,530	

(x) KFX = Korean Foreign Exchange.

Table No. 7

KOREAN NATIONAL RAILROAD

Revised Railway Investment Program 1962 - 1966
(Amounts in million $ and million Hwan)

ITEM	1962 Foreign Exchange $ Equiv.	1962 Local Currency Hwan	1962 Total Hwan Equiv.	1963 Foreign Exchange $ Equiv.	1963 Local Currency Hwan	1963 Total Hwan Equiv.	1964 Foreign Exchange $ Equiv.	1964 Local Currency Hwan	1964 Total Hwan Equiv.	1965 Foreign Exchange $ Equiv.	1965 Local Currency Hwan	1965 Total Hwan Equiv.	1966 Foreign Exchange $ Equiv.	1966 Local Currency Hwan	1966 Total Hwan Equiv.	Total Foreign Exchange $ Equiv.	Total Local Currency Hwan	Total Hwan Equiv.	Proposed Changes from Government's Plan
New Line Construction																			
1. Hwangji Line, 16.0 km (Tongni-Simpori and Hwangji-Paeksanni)	0.30	3,600	3,990	-	-	-	-	-	-	-	-	-	-	-	-	0.3	3,600	3,990	-
2. Kyungbuk Line, 58.6 km (Yungju-Chomchon)	0.70	2,300	3,210	0.70	2,300	3,210	0.60	2,300	3,080	-	-	-	-	-	-	2.0	6,900	9,500	-
3. Ningeui Line, 5.4 km (Kanung-Uijongbu)	0.04	80	132	0.03	60	99	0.03	60	99	-	-	-	-	-	-	0.1	200	330	-
4. Chungsun Line, 42.0 km (Hambaeck-Chungsun)	0.60	3,150	3,930	0.60	3,150	3,930	0.60	3,100	3,880	-	-	-	-	-	-	1.8	9,400	11,740	-
5. Tonghae Pukbu Line, 92.9 km (Okkae-Kangnung-Sokcho)	0.80	2,100	3,140	0.70	2,100	3,010	0.70	2,100	3,010	-	-	-	-	-	-	2.2	6,300	9,160	-
6. Kyungjun Line, 80.5 km (Chinju-Sunchon) first section 40 km	-	-	-	-	-	-	-	-	-	0.60	2,900	3,680	0.60	2,900	3,680	1.2	5,800	7,360	First section 40 km by 1966, completion 1968.
Sub-total New Line Construction	2.44	11,230	14,402	2.03	7,610	10,249	1.93	7,560	10,069	0.60	2,900	3,680	0.60	2,900	3,680	7.6	32,200	42,080	
Electrification and Double Tracking																			
7. Kyungin Line, 31.7 km (Seoul-Inchon)	-	-	-	-	-	-	-	-	-	0.80	2,000	3,040	0.80	2,000	3,040	1.6	4,000	6,080	Double tracking by 1966. Electrification postponed.
Motive Power and Rolling Stock																			
8. Procurement of 100 diesel electric locomotives	-	-	-	17.00	100	22,200	-	-	-	-	-	-	-	-	-	17.0	100	22,200	Major part of delivery shifted to 1963.
9. Procurement of 145 diesel railcars	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Postponed.
10. Procurement of 75 passenger cars (3rd Class)	1.20	-	1,560	2.40	-	3,120	-	-	-	-	-	-	-	-	-	3.6	-	4,680	Number of cars and procurement schedule adjusted to available loan amount and price adjusted according to most recent bids.
11. Procurement of 40 passenger cars (2nd Class)	-	-	-	2.40	-	3,120	-	-	-	-	-	-	-	-	-	2.4	-	3,120	
12. Procurement of 800 coal hopper cars (I part)	2.40	-	3,120	4.80	-	6,240	-	-	-	-	-	-	-	-	-	7.2	-	9,360	Number of cars and procurement schedule adjusted to available loan amount.
13. Procurement of 200 coal hopper cars (II part)	-	-	-	-	-	-	-	-	-	1.80	-	2,340	-	-	-	1.8	-	2,340	
14. Local production of 400 passenger cars	0.30	3,360	3,750	0.30	3,360	3,750	0.30	3,360	3,750	0.30	3,360	3,750	0.30	3,360	3,750	1.5	16,800	18,750	-
15. Local production of 1,800 freight cars	-	-	-	0.60	2,000	2,780	0.60	2,000	2,780	1.00	3,300	4,600	1.40	4,700	6,520	3.6	12,000	16,680	Reduced by 35%.
16. Conversion of 500 wooden freight cars to steel bodies and rebuilding of 325 cars	-	650	650	-	650	650	-	-	-	-	-	-	-	-	-	-	1,300	1,300	-
Sub-total Motive Power and Rolling Stock	3.90	4,010	9,080	27.50	6,110	41,860	0.90	5,360	6,530	3.10	6,660	10,690	1.70	8,060	10,270	37.1	30,200	78,430	
Improvement of Railway Facilities																			
17. Improvement of workshops for the purpose of an annual output of 100 passenger cars and 350 freight cars	0.80	160	1,200	0.80	160	1,200	0.80	160	1,200	0.80	160	1,200	0.80	160	1,200	4.0	800	6,000	Reduced by 25%. Balance postponed.
18. Extension of tracks within yards on major industrial lines, reinforcement of tracks and improvement of safety facilities	0.20	800	1,060	0.20	800	1,060	0.20	800	1,060	-	-	-	-	-	-	0.6	2,400	3,180	-
19. Installation and improvement of marshalling yards	-	-	-	0.18	630	864	0.18	630	864	0.17	620	841	0.17	620	841	0.7	2,500	3,410	-
20. Extension of unloading facilities of the port of Mukho	0.10	20	150	-	-	-	-	-	-	-	-	-	-	-	-	0.1	20	150	-
21. Improvement of power communication and signal facilities	0.04	520	572	0.04	520	572	0.04	520	572	0.04	520	572	0.04	520	572	0.2	2,600	2,860	-
22. Improvement of Seoul Station	-	-	-	0.05	675	740	0.05	675	740	0.05	675	740	0.05	675	740	0.2	2,700	2,960	-
23. Procurement of 1,800,000 prestressed concrete ties and 7,000 prestressed concrete poles	0.84	4,100	5,192	0.84	4,100	5,192	0.84	4,100	5,192	0.84	4,100	5,192	0.84	4,100	5,192	4.2	20,500	25,960	-
Sub-total Improvement of Railway Facilities	1.98	5,600	8,174	2.11	6,885	9,628	2.11	6,885	9,628	1.90	6,075	8,545	1.90	6,075	8,545	10.0	31,520	44,520	-
24. Financial Consultants	0.05	-	65	0.05	-	65	-	-	-	-	-	-	-	-	-	0.1	-	130	Recommended by IDA.
Summary																			
1-6 Sub-total New Line Construction	2.44	11,230	14,402	2.03	7,610	10,249	1.93	7,560	10,069	0.60	2,900	3,680	0.60	2,900	3,680	7.6	32,200	42,080	-
7 Sub-total Electrification & Double Tracking	-	-	-	-	-	-	-	-	-	0.80	2,000	3,040	0.80	2,000	3,040	1.6	4,000	6,080	-
8-16 " Motive Power & Rolling Stock	3.90	4,010	9,080	27.50	6,110	41,860	0.90	5,360	6,530	3.10	6,660	10,690	1.70	8,060	10,270	37.1	30,200	78,430	-
17-23 " Improvement of Railway Facilities	1.98	5,600	8,174	2.11	6,885	9,628	2.11	6,885	9,628	1.90	6,075	8,545	1.90	6,075	8,545	10.0	31,520	44,520	-
24 Financial Consultants	0.05	-	65	0.05	-	65	-	-	-	-	-	-	-	-	-	0.1	-	130	-
Total	8.77	20,840	31,721	31.69	20,605	61,802	4.94	19,805	26,227	6.40	17,635	25,955	5.00	19,035	25,535	56.40	97,920	171,240	
Contingencies	0.42	3,126	3,672	1.58	3,091	5,145	0.25	2,971	3,296	0.64	4,409	5,241	0.50	4,759	5,409	3.39	18,356	22,763	Addition of 5% contingencies for foreign exchange expenditure and of 15% for local currency expenditures in 1962-4, and of 10% and 25% respectively in 1965-6.
GRAND TOTAL	8.79	23,966	35,393	33.27	23,696	66,947	5.19	22,776	29,523	7.04	22,044	31,196	5.50	23,794	30,944	59.79	116,276	194,003	

Table No. 8

Table 9

KOREAN NATIONAL RAILROAD

Coal Car Requirements 1961 - 1967 a/

	1961	1962	1963	1964	1965	1966	1967
Gondola cars at beginning of year	n.a.	3,746	3,746	4,546	4,546	4,846	5,126
To be scrapped during year	n.a.	-	100	100	100	120	150
Balance		3,746	3,646	4,446	4,446	4,726	4,976
Additions during year:							
Imports	-	-	800	-	200	-	-
Local production	-	-	100	100	200	400	400
Balance end of year	3,746	3,746	4,546	4,546	4,846	5,126	5,376
Average fleet during year	3,643	3,746	4,146	4,546	4,696	4,986	5,251
Less 5% under or awaiting repair	459	187	207	227	235	249	263
Average number of cars available	3,184	3,559	3,939	4,319	4,461	4,737	4,988
Less 20% for cars carrying traffic other than coal	624	712	788	864	892	957	998
Average number of cars available for coal traffic	2,560	2,847	3,151	3,455	3,569	3,780	3,990
Average carrying capacity, tons per car and year	2,220	2,200	2,200	2,200	2,300	2,400	2,400
Total carrying capacity of coal car stock (000 tons)	5,698	6,270	6,932	7,601	8,209	9,072	9,576
Estimated coal transport (000 tons)		6,400	7,000	7,500	8,300	9,100	9,900
Surplus (deficit) (000 tons)		(130)	(68)	101	(91)	(28)	(324)

a/ 1961 actual, 1962-1967 estimate.

KOREAN NATIONAL RAILROAD

Source and Use of Funds for Revised 1962-1966 Program
(Billions of Hwan)

Table No. 10

	1962	1963	1964	1965	1965	Entire Period 1962 - 1966
Source of Funds						
Beginning of Period						
Current assets (excluding stores)	4.9					
Current liabilities	2.1					
Subtotal, Working Capital	2.8	2.8	3.2	5.6	3.7	2.8
Funds now foreseeable						
Net Income (or Loss) (see Table 6)	(3.3	(0.7)	2.8	7.4	9.2	15.4
Depreciation	9.7	10.7	11.3	12.0	12.7	56.4
General Account (see Table 12)	8.0	15.4	13.9	5.5	8.0	50.7
Loans under consideration						
IDA	5.0	13.2	-	-	-	18.2
AID	-	22.1	-	-	-	22.1
Subtotal	19.4	60.7	28.0	24.9	29.9	162.8
Additional funds required						
Loans	16.0	4.0	-	-	-	20.0
Increase in freight rates, June 1, 1963	-	4.5	8.5	9.0	9.5	31.5
Subtotal	16.0	8.5	8.5	9.0	9.5	51.5
Total sources of funds	38.2	72.0	39.8	39.5	43.1	217.1
Use of Funds						
Revised Investment Program	35.4	66.9	29.5	31.2	30.9	194.0
Repayment of BOK loan	0.4	0.3	0.3	0.3	0.3	1.4
Repayment of loans under consideration						
IDA	-	-	0.7	0.7	0.7	2.2
AID	-	-	1.5	1.5	1.5	4.4
Repayment of additional loans required	-	1.6	2.0	2.0	2.0	7.6
Total funds required	35.8	68.8	34.0	35.7	35.4	209.6
Working Capital End of Period	2.0	3.2	5.6	3.7	7.5	7.5

Table No. 11

KOREAN NATIONAL RAILROAD

Cash Generation and Debt Service Cover, 1962-66
(Millions of Hwan)

	1962	1963	1964	1965	1966
Net Operating Revenue	(3.5)	0.0	6.0	10.3	11.9
Depreciation	9.7	10.7	11.3	12.0	12.7
Other Income	0.3	0.3	0.3	0.3	0.3
Cash generated by KNR	6.5	11.0	17.6	22.6	24.9
Interest					
On present debt	0.1	0.1	0.1	0.1	0.1
On proposed loans:					
IDA	-	-	1.0	1.0	1.0
AID	-	-	1.3	1.2	1.1
On additional loans required	-	0.9	1.1	0.9	0.8
Total interest	0.1	1.0	3.5	3.2	3.0
Amortization					
Present debt	0.4	0.3	0.3	0.3	0.3
Proposed loans:					
IDA 1/	-	-	0.7	0.7	0.7
AID 2/	-	-	1.5	1.5	1.5
Additional loans required 3/	-	1.6	2.0	2.0	2.0
Total amortization	0.4	2.9	4.5	4.5	4.5
Total debt service	0.5	2.9	8.0	7.7	7.5
Times interest earned	- 35.0	-	1.7	3.2	4.0
Debt Service Ration	13.0	3.8	2.2	2.9	3.3

Assumptions:

1/ Loan of Hw 18.2 billion, 25 years, 5 3/4 per cent interest.
2/ Loan of Hw 22.1 billion, 15 years, 5 3/4 per cent interest.
3/ Loans of Hw 16.0 billion in 1962 and of
Hw 4.0 billion in 1963, each at 10 years, 5 3/4 per cent interest

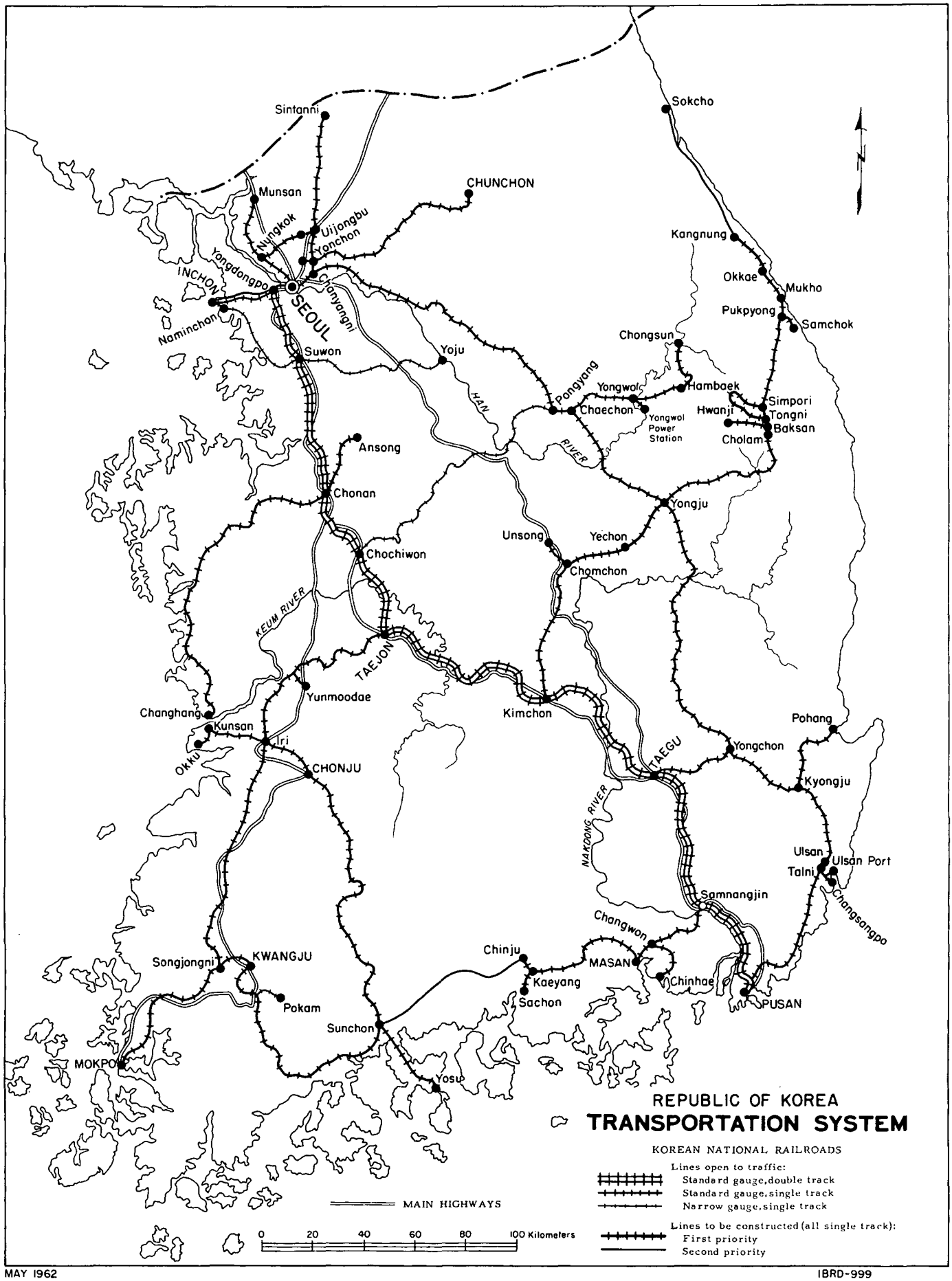
KOREAN NATIONAL RAILROAD

Proposed Financing from General Account of
Revised Investment Program 1962-1966
(Billions of Hwan)

	1962			1963			1964			1965			1966			Entire Period 1962 - 1966		
	Foreign Exchange	Local Currency	Total	For. Exch.	Local Cur.	Total	For. Exch.	Local Cur.	Total	For. Exch.	Local Cur.	Total	For. Exch.	Local Cur.	Total	For. Exch.	Local Cur.	Total
Tonghae Pukbu Line	-	-	-	1.2	2.6	3.8	0.8	1.8	2.6	-	-	-	-	-	-	2.0	4.4	6.4
Chungsun Line	0.8	3.1	3.9	0.8	3.1	3.9	0.7	3.1	3.9	-	-	-	-	-	-	2.3	9.4	11.7
Kyungbuk Line	0.9	2.3	3.2	0.9	2.3	3.2	0.8	2.3	3.1	-	-	-	-	-	-	2.6	6.9	9.5
Construction of 1,800 freight cars	-	-	-	0.8	2.0	2.8	0.8	2.0	2.8	1.3	3.3	4.6	1.8	4.7	6.5	4.7	12.0	16.7
Sub-total	1.7	5.4	7.1	3.7	10.0	13.7	3.1	9.2	12.4	1.3	3.3	4.6	1.8	4.7	6.5	11.6	32.7	44.3
Contingencies *	0.1	0.8	0.9	0.2	1.5	1.7	0.2	1.4	1.5	0.1	0.8	0.9	0.2	1.2	1.5	0.7	5.6	6.3
Total	1.8	6.2	8.0	3.9	11.5	15.4	3.3	10.6	13.9	1.4	4.1	5.5	2.0	5.9	8.0	12.3	38.4	50.7

* 5% for foreign exchange costs and 15% for local currency costs in 1962-4, 10% and 25% respectively in 1965-6.

Table No. 12



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